

SPIE Conference: SS04, Chair: Yoseph Bar-Cohen

ABSTRACT TITLE: Electroactive polymers (EAP) characterization methods

AUTHOR LISTING:

Yoseph Bar-Cohen and Sean Leary -- JPL/Caltech, (MC 82-105), 4800 Oak Grove Drive, Pasadena, CA 91109-8099, Phone 818-354-2610, Fax 818-393-4057, yosi@jpl.nasa.gov web: <http://ndea.jpl.nasa.gov>

PRESENTATION - Oral Presentation

ABSTRACT TEXT

EAP materials are very attractive for their ability to emulate biological muscles and to induce strong displacements (bending or longitudinal). In recent years, new EAP materials have emerged that are enabling new types of actuators and devices that are not feasible with the alternative striction limited transducing materials (e.g., electro-ceramics and shape memory alloys). However, in contrast to the impressive level of displacement that can be induced, these materials are producing a relatively small actuation force that is significantly limiting their potential applications. The main challenge to the research community is to bring the actuation force capability of EAP materials to the level that can match or exceed the performance of biological muscles (hopefully having a robot powered by such muscles win an arm wrestle with human). To achieve this goal it is necessary to address a series of issues that are essential to the infrastructure of this technology, including the need to understand the mechanisms that are responsible for electro-activity. The large displacement, low dielectric constant and low stiffness are causing difficulties to using conventional techniques to determining their properties and performance. The authors are currently involved in a study to develop consistent and methodic approach to the characterization of EAP and the results will be presented in this paper.

KEY WORDS: Electroactive Polymers, Planetary Applications, Artificial Muscles, and Characterization.

BRIEF BIOGRAPHY: Dr. Yoseph Bar-Cohen is a physicist with over 28 years experience in NDE, sensors, actuators and electroactive materials. He is the Jet Propulsion Lab (JPL) Resident NDE expert and the Group Leader for the NDE& Advanced Actuators (NDEAA) Technologies. Also, he is an Adjunct Professor at the Department of the Mechanical and Aerospace Engineering, the University of California, Los Angeles (UCLA), a Fellow of the American Society for NDT (ASNT) and Chair of the ASNT's Ultrasonic Committee. Dr. Bar-Cohen is leading a NASA task to develop applications for EAP materials. Some of his contributions include his discoveries the leaky Lamb waves and the polar backscattering in composite materials and co-pioneered their applications to NDE. He is the author of more than 170 publications, made numerous presentations at national and international symposia and holds many patents.